Multidisciplinary Field Experiments on Effects of Channel Realignment in Extensive Brackish Tidal Marsh Restoration

#0049

Technical Panel Review

Proposal Name: Multidisciplinary Field Experiments on Effects of Channel Realignment in Extensive Brackish Tidal Marsh Restoration

Applicant Organization: California State University, East Bay Foundation

Principal Lead Investigator(s):
Kitting, Chris

Amount Requested: $643,818

TSP Panel Summary of Findings:

The proposed work is very feasible, as the investigators have been studying this system for some time and are generally well qualified. The proposed work emphasizes specific marsh features (connectivity, tidal marsh pools of shallow, brackish water, marsh vegetation) that may, if included or promoted in other studies, enhance the value of future and current marsh restoration projects. They emphasize mechanisms and features that may allow "constructed" marshes to outperform reference marshes, which is very intriguing. Their approach feeds well into adaptive management practice. However, the panel felt that the proposal had considerable shortcomings. The premise of the project – that sea level rise, land subsidence, sediment contamination, and water diversion will probably require extensive construction of new waterways and tide gates on improved levees, particularly in the Delta –is not well founded and thus the project relevance to CALFED is not high. The use of the Nekton Gate at Peyton Slough is a very good solution for addressing the need to push tides vertically downward in settings where the marsh restoration area is subsided but remains within the tidal range and is surrounded by low–lying lands or infrastructure needing flood protection. Beyond those conditions, which are found in some parts of the lower estuary but for the most part not within the Delta given the extent of subsidence, the Nekton Gates are not necessary. Further, the project is not premised on these gates nor on reconstructing a new tidal channel; they happen to be circumstances of this particular study site which will be

studied opportunistically. The study design is not clearly articulated.

Overall, the shortcomings of this proposal are that the conceptual model is vague and general, the approach is not linked to the hypotheses from the conceptual model nor does it include many key elements it would need to link to that model, it does not draw well upon the literature from this estuary, the scope and budget are not adequately described to document what CALFED would be receiving for its investment, and as a result is not likely to add a solid scientific contribution to our understanding of marsh restoration. In short, the proposal does not clearly describe what will be studied and why. Furthermore, if channel-side pools were natural then we would expect to see them in existing tidal marshes yet no such configurations exist in this estuary. Some restorations do have such a configuration for ephemeral periods during their development but they result from geomorphic circumstance and do not persist. Thus, while the hypothesized function may in fact exist suggesting their inclusion in restoration projects as an expected ephemeral feature, they must be recognized as a temporary contribution to recovery of target fish species.

Relevance to PSP Topic Areas:

Moderate

TSP Technical Rating:
Inadequate

TSP Funding Recommendation:
Do Not Fund

TSP Amount Recommended: $**0**

Conditions:

External Technical Review #1

Proposal Title: Multidisciplinary Field Experiments on Effects of Channel Realignment in Extensive Brackish Tidal Marsh Restoration

Proposal Number: 0049

Proposal Applicant: California State University, East Bay Foundation

Purpose

Comments	**The goals, objectives and hypotheses are stated but are not always clear. The idea is very timely and important. The study is justified given our current understanding of marsh restoration. The results would add to the base knowledge of what actions (e.g., presence of marsh tidal pools along constructed channels) enhance the restoration of marshes. Overall the proposal is not written very well and that detracts from the value of the science that I feel it would contribute were it funded.**
Rating	**Above Average**

Background

Comments	**A simple, trophic based, conceptual model is stated with verbal descriptions of potential limiting factors that could reduce energy transfer between trophic levels. Their description of "limiting factors" is simplistic, vague and generalized. This does not expalin very well the underlying basis for their proposed work.**
Rating	**Sufficient**

Approach

Comments	**The approach is well designed and appropriate for comparing restored marshes to reference marshes. They**

	have generally defined who would be performing various tasks. The products would be publishable and contribute significantly to our knowledge of marsh restoration processes. There is a very good plan for widespread and effective dissemination of information gained from the project; this is enhanced by the University affiliation of the authors.
Rating	Above Average

Feasibility

Comments	The approach is relatively well documented and very technically feasible. Details of sampling are not presented (e.g., number of sample locations, parameters measured at each location, seasonal sampling regime). Since they are comparing restored marsh dynamics with a reference marsh the likelihood of suceess is high. The scale of the project is within the grasp of the authors.
Rating	Above Average

Budget

Comments	It is clear how much each aspect of the work will cost. However, the work breakdown structure is coarse with little to no definition of task two. Presumably task two covers all of the sampling and analysis costs. It is difficult to access adequacy of the budget and we must assume that they will do as much sampling and analysis as the budget permits. Given the authors University affiliation, and matching funds, it appears that these funds will yeild a lot of information about the processes of marsh restoration.
Rating	Above Average

Relevance To CALFED

Comments	The proposal is an interdisciplinary project with collaborating agencies and matching funds. The project contributes understanding to the following Priority

	Research Topics: Aquatic Invasive Species, Trends and Patterns of Populations and Response to Change, and Habitat Availability and Response to Change. The nexus to these topics, however, is not direct. Essentially they are analyzing proecesses that lead to enhanced production of restored marshes as compared to reference marshes. This information may inform us of the drivers that affect production and allow sound inference to the Priority Research Topics. However, the priority topics are not directly analyzed in this proposal.
Rating	**Above Average**

Qualifications

Comments	**The PI and his collegue are noteworthy published scientists. In addition, the PI (Dr. Kitting) has successfully completed another CALFED grant (but not a Science Program grant). Consequently, the track record of the author's is good. The project team is qualified to effectively implement the proposed project. They have the available infrastructure (e.g., mobile and floating laboratories) and other support to successfully complete the proposed scope of work.**
Rating	**Superior**

Overall Evaluation Summary Rating

Comments	**I believe that the overall scientific approach is sound and will provide valuable insight into measures that will enahance the productivity of restored wetlands. The proposal is not very clearly written, so that detracts from the overall quality of the proposed approach. I am sure that the information gained will contribute to our understanding of various limiting factors on productivity in shallow, brackish marshes. This has a high probability of contributing to our understanding of successful marsh restoration. Understanding the process that enhance productivity may give insight into the response of these systems to**

	change.
Rating	**Above Average**

External Technical Review #2

Proposal Title: Multidisciplinary Field Experiments on Effects of Channel Realignment in Extensive Brackish Tidal Marsh Restoration

Proposal Number: 0049

Proposal Applicant: California State University, East Bay Foundation

Purpose

Comments	**The proposed research seeks to take advantage of the fact that a new slough has been built linking McNabney Marsh to Suisun Bay. The new slough replaces an existing, contaminated slough. Although this may be a relevant type of restoration project to evaluate, the project lacks meaningful hypotheses, is poorly organized, and has inadequately documented sampling protocols. Because of the lack of rigor in the hypotheses and experimental design, the study is unlikely to generate usable information. Even the title of the proposal is indicative of the lack of focus and direction in the proposal. The main hypothesis is that "a positive correlation exists between increased population densities of most aquatic animals (including splittail and herring) and the presence of marsh tidal pools (shallow, permanent quiet−water areas) along constructed channels." There is no proposed quantification of this hypothesized correlation, no attempt to analyze the critical characteristics of these pools, no attempt to understand the causal mechanisms that result in the relationship. A second hypothesis is that habitat value of suitably restored marshes will eventually exceed that of reference marshes, but there is no mention of how long that process might take and how that relates to the time scale of the proposed research.**
Rating	**Inadequate**

Background

Comments	The conceptual model is simplistic with no explanatory power. Tidal action and connectivity are not included in the model. No mechanisms of interaction are indicated. Basic factors such as salinity and pool size (area, depth) are not incorporated. The conceptual model is basically that the presence of marsh pools leads to emergent vegetation, which leads to zooplankton and zoobenthos, which leads to larval and juvenile native fishes, which exchange with adult fishes in deeper water and are also linked with resident smaller fishes that are connected to deeper water via eggs and juveniles. The description of results from previously funded research are a list of anecdotal observations and vague correlations with no evidence of quantification of relationships. I see nothing in the current proposal that suggests the products of the proposed research will be any different. The proposal is riddled with buzzwords, and the ideas lack coherence.
Rating	Inadequate

Approach

Comments	The experimental design is not adequately described. Although research objectives are listed, those objectives are not linked with proposed sampling or experiments. There is an inadequate description of number of sites (maybe 4?), with no justification for number of reference sites, how they were chosen, or how their characteristics (even something as simple as salinity and pool size) can be related to the experimental sites. The ideas are not presented in a logical framework. For example, there is mention of the possibility of doing some mesocosm experiments with Delta smelt; but nothing is said about what question they are trying to answer with these experiments or even what the experimental manipulation would be. It appears that the PI will be responsible

	for project management, with assistance from graduate students. A second investigator is responsible for one part of the project. The vague task descriptions (task 1 is basically administration, task 2 is the research with no description of effort directed toward individual objectives), lack of specificity in the time line (tasks 1 and 2 occur throughout the entire period), and lack of budget detail associated with the two tasks (e.g., amount of budget directed toward each objective) are indicative of the inadequate planning and organization of this project. Outreach plans are vague, although it is clear that opportunities exist for dissemination of information through interactions with agencies and the Marsh Management Steering Committee. Specific plans to take advantage of these opportunities are not presented.
Rating	Inadequate

Feasibility

Comments	The approach is not fully documented so it is impossible to judge whether it is feasible. Some of the proposed sampling methods (e.g., traps with LED lights to attract juvenile fish) seem incapable of providing quantitative measures of population densities (what is the area from which the individuals caught in traps are coming?); yet quantitative measures are needed to test the hypotheses. Experiments are not linked with the research objectives.
Rating	Inadequate

Budget

Comments	The budget is not adequately described. Budgets are not linked with research objectives, so it is impossible to judge if an adequate amount is budgeted to meet each research objective.
Rating	Inadequate

Relevance To CALFED

Comments	**The proposal could be relevant to the Ecosystem Restoration Program. It is more difficult to see how it is relevant to the priorities of the 2006 Science Program PSP. The proposal goes into detail on the CALFED goals and uncertainties supposedly being addressed, but these goals and uncertainties are those identified by the Ecosystem Restoration Program. The proposal notes that because they can simulate sea level rises with tide gates, priority 3 (trends in response to a changing environment) could be tested; that may be true, but no experimental protocol to test that is included in the proposal.**
Rating	**Inadequate**

Qualifications

Comments	**The investigators appear to have a good working relationship with the individuals and agencies doing the restoration. The track record of publication from prior funding is not particularly strong, consisting primarily of annual reports.**
Rating	**Sufficient**

Overall Evaluation Summary Rating

Comments	**As detailed above, the proposal lacks: a substantive conceptual model, rigorous testable hypotheses, a clearly articulated experimental design, budget information linked to project objectives, and a compelling connection to 2006 PSP priorities.**
Rating	**Inadequate**

External Technical Review #3

Proposal Title: Multidisciplinary Field Experiments on Effects of Channel Realignment in Extensive Brackish Tidal Marsh Restoration

Proposal Number: 0049

Proposal Applicant: California State University, East Bay Foundation

Purpose

Comments	**The overall approach of this proposal is interesting and valuable and the location and condtitions represent an unique opportunity to study marsh restoration under controllable conditions.** **Unfortunatley, the questions, hypotheses and goals of the proposal are not clearly articulated and seem to reflect a 'we'll see what we find out" approach rather than teh hypothesis testing approach that the site lends itself to.** **Regardless of the proposal's deficiencies, the chance to examine marsh response to different inundation regimes would almost have to generate interesting and valuable information. Doubtless the researchers are capable of gathering interesting data and extracting worthwhile information. However, they seem to have no particular approach in mind for tying together all the different kinds of data they propose to gather and instead seem to rely on a rather Baconian approach to science.**
Rating	**Sufficient**

Background

Comments	**The strength of this proposal rests upon the ability to experimentally manipulate one marsh and compare its responses to other restored marshes and with a reference marsh. The conceptual model describes how a trophic ladder can supply and attract fish to and from deeper water habitat. The conceptual model relates in no way to the hypotheses that marsh form (in the nature having of ponds attached to tidal channels or not) or that marsh inundation patterns can affect the trophic ladder.** **Background literature concentrates on the published work of the PI and of other work in estuarine systems elsewhere. Few references are made to the relevant work that has been done here. At several places the author refers to possible values of ponds in catching or concentrating nutrients to spur plant growth, seemingly with no awareness of the numerous studies that have been done in this system documenting that nutrients ar seldom, if ever, limiting.**
Rating	**Inadequate**

Approach

Comments	**Little detail is given on how the impacts of ponds or inundation will affect be studied. Will ponds be connected and disconnected from the tidal channel? Will different water levels be imposed over days? weeks? months? years? Which plant growth and fish abundance patterns are expected to vary with varying water depths?** **The schedule of work is adequate and responsibilities are basically clear. The PI seems in an ideal position**

	to circulate results to interested parties and to students.
Rating	Sufficient

Feasibility

Comments	Although details are minimal, the history of the PI gives confidence that the project is feasible and would be carried out in a thorough and enthusiastic fashion.
Rating	Sufficient

Budget

Comments	The bulk of the funding is for personnel which also recieves funding under a matching funds arrangement with the university. Thus these costs are reasonable. Funding for other groups is smaller but it could be clearer what work each group is doing.
Rating	Sufficient

Relevance To CALFED

Comments	The results of these studies could have great relevance to CalFed as it prepares to deal with changing sea level and with the restoration of marsh habitats elsewhere. The authors demonstrate some clear connections to the PSP priorities (although liberties are taken with the meaning of Environmental Water). The proposal would gather a variety of interdisciplnary data from a system that can uniquely be manipulated. However I have little confidence from this proposal that the data would be adequately synthesized or that clear causal chains would be illuminated.
Rating	Superior

Qualifications

Comments	**The PI has already done substantial work of this sort under previous CalFed funding, under work for other groups and on his own initiative. Their ability to pursue this topic as described in the proposal is without question.**
Rating	**Superior**

Overall Evaluation Summary Rating

Comments	**The study site offers several important attractions and the PI clearly carries substantial enthusiams and connections for scientifically exploiting the site. However, I would recommend that CF take this as part of a directed action and help the PI work with a suitable science advisory group to develop an approach that would have more clearly designed hypotheses and experimental procedures.**
Rating	**Sufficient**